

Employee Spotlight



Goddard Researcher Receives Medal from the Crown Prince of Denmark

By Cynthia O'Carroll

Photo by Royal Danish Geographical Society

Dr. Compton J. Tucker was awarded the Galathea Medal of the Royal Danish Geographical Society on November 2 in Copenhagen, Denmark. His Royal Highness (HRH) Prince Frederik, the Crown Prince of Denmark, presented the award to Tucker in the presence of 120 invited guests.

The Galathea Medal is given to scientists that have contributed significantly to the development of geography, and Danish geography specifically. The use of Earth observation from space plays an ever-increasing role in geography all over the world.

"NASA has played a leading role in the development of Earth observation and Dr. Tucker has had a key position in this development," stated the HRH Prince Frederik, President of the Royal Danish Geographical Society. "Dr. Tucker and his co-workers have made great contributions to our understanding of environmental change in many parts of the world, including the study of tropical deforestation using satellite images from Landsat and other satellites. Some of the major Danish geographical research activities in the Sahel-zone of Africa directly build on and continue his work from some 20 years ago."

Tucker is a senior Earth scientist at NASA Goddard's Laboratory for Terrestrial Physics and has been a pioneer in the use of satellite data to study the Earth. He has been internationally recognized for developing the use of spectral vegetation indices to study green vegetation and primary production through time. This work was first developed from ground-based experiments and subsequently applied by Earth-orbiting satellites to the entire terrestrial surface. Spectral vegetation indices are the most widely used type of Earth science data about vegetation on land. Tucker has also used Landsat data to study tropical deforestation and habitat fragmentation, to establish accurate information for understanding the carbon cycle and preventing further loss of terrestrial biological diversity. He and his co-workers were among the first to use Landsat data to study habitat fragmentation of tropical forests.

"The gratitude expressed towards Professor Tucker and to NASA for a significant contribution to science, specifically the geographical sciences, was warmly sustained by all Danish participants at the awards ceremony," stated Sofus Christiansen, Vice President of the Royal Danish Geographical Society. "This well deserved medal is also a recognition of the American generosity that has allowed our little nation to benefit from NASA's tremendous technical achievements."

Tucker began his career at Goddard in 1975 as a National Research Council postdoctoral fellow and subsequently joined NASA in 1977. He has specialization in using satellite observations to study the Earth's vegetation, including questions about the carbon cycle, tropical deforestation and



Dr. Compton J. Tucker receives the Galathea Medal from His Royal Highness the Crown Prince of Denmark.

desertification. Some areas of recent and continuing work include quantifying the expansion and contraction of the major deserts of Africa and Asia; studying terrestrial vegetation from space including tropical deforestation, studying global photosynthesis and how it varies with climate; studying ecologically linked diseases and using satellite data to reduce human suffering as in the Famine Early Warning System for Africa and Central America

Tucker has traveled extensively during his career as a NASA Goddard research scientist. Some of his more unusual trips have been to the Amazon Basin of South America, in Brazil and Bolivia, all associated with studying tropical deforestation there.

In 1998 and again in 2002, Tucker was involved in the Iturralde Crater Expeditions and spent weeks in Bolivia hiking in a very remote portion of the Amazon rainforest studying a possible meteorite crater. The Amazon is a salt-limited area since the rain leaches most of the salt away. In the rain forest, the team was deluged with many insects, including bees and wasps, looking for a source of salt. Because bees and wasps are social insects, they communicate the location of salt to their fellow insects causing them to swarm and sting humans. The scientists received as many as 10 to 20 stings a day as the insects converged, feeding off of them like walking salt licks.

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Bathing in the rivers to wash the salt off their bodies and clothes was necessary on a daily basis but it posed many other risks. The murky water hides many dangers, such as manta rays and electric eels, and the former can deliver deadly stings.

"People have lost their legs from being stung by manta rays. If you step on an electric eel, you are in for a big shock – about 600 volts," says Tucker. "That discharge will paralyze you and you could drown if you aren't with a friend. "Electric eels are the most dangerous animal you can encounter, much more so than piranhas, snakes, or jaguars."

Photo by: P. Wasilewski



Tucker and Tim Killeen in motorized canoe on the Rio Manupare in Bolivia, returning to Puerto Araona after the first expedition to the crater in 1998.

As for Piranhas, Tucker says that they are over-rated as far as being really dangerous. "I've only been nibbled on once or twice by piranhas, but they are good to eat, although pretty bony," remarked Tucker. While on their first expedition to the meteor crater, Tucker and Peter Wasilewski, also of Goddard, along with their friend from Bolivia, Tim Killeen, had nothing to eat but piranhas for three days. "They were pretty tasty especially since we didn't have a choice," laughed Tucker.

Another risk of these adventures is the possibility of contracting an unusual disease. Tucker's good friend, Tim Killeen, came down with a strange tropical virus on their second expedition to the meteor crater and had to be flown for treatment to Brazil to the best hospital in South America.

"He lapsed into a coma on the hospital ambulance plane and had to be kept alive in flight with periodic shots of adrenalin. He was unconscious for five weeks in the Einstein Hospital in Sao Paulo Brazil. We thought he was gone for good, but he recovered," remarked Tucker. Why Tucker and Wasilewski did not come down with the same disease is anyone's guess.

The only time Tucker was in serious physical trouble was in 1996 in tropical Bolivia where his team ran out of water under the hot tropical sun in Noel Kempff National Park. Tucker and another researcher began to suffer severe heat stroke and

headed to a seasonal small stream that was dry. "We were lucky to find one pool of stagnant water, completely surrounded by animal droppings from tapirs, anteaters, monkeys, jaguars, you name it—it was there. What do you think we did? We jumped in and drank as much of the water as we could. Best water I've ever tasted," Tucker said.

Another of Tucker's research activities concerns documenting the expansion and contraction of the major deserts in Africa and Asia using the NOAA Advanced Very High Resolution Radiometer. In 1993 a trip to the Gobi Desert in Mongolia was plagued by tremendous rains, terrible roads and washed out bridges that forced the researchers to return to the area later that year. What should have been a 10-day trip became a trip of more than three weeks.

The Mongolian people are traditionally very generous with visitors and often fed the team meals of boiled sheep meat and khomis, fermented mare's milk. As honored guests at one Mongolian feast, the men were required to eat first from the main dish of boiled sheep stomach and intestines, both stuffed with blood, before anyone else could partake. Another memorable, and now comical event on this trip was Tucker's frantic attempt to get away from an aggressive camel that chased him into a car and then tried to bite him through the open window. "Camels have nasty dispositions and can deliver a bad bite. They also have very bad breath," said Tucker.

"In spite of all the dangers encountered during my many adventures, I enjoy traveling to these remote areas to study the environment and learn about the people and their culture," remarked Tucker. "My research for NASA allows me the freedom to pursue many interests at the same time.

Tucker is also an adjunct professor at the University of Maryland in College Park and he often lectures at other universities. After receiving the Galathea Award in Denmark, he gave lectures in Norway, Sweden and Belgium.

Other awards received by Tucker include NASA's medal for Outstanding Scientific Achievement awarded in 1987, the Henry

Photo by: P. Wasilewski



Here in the tropical rainforest the true Compton is revealed. Tim Killeen at left, and two Araona natives guides, travel with Tucker to the edge of the Iturralde crater in Bolivia.

Tucker (cont'd from pg 8)

Shaw Medal from the Missouri Botanical Garden in 1992, and the National Air and Space Museum Trophy for Current Achievement in 1993. In 1995, Tucker was the first American, along with his friend and former astronaut Mary Cleave, to receive the Mongolian Medal of Friendship for their work in Mongolia. Also in 1995, he received the William Nordberg Memorial Award for Earth Science for his studies of the Earth's vegetation from space. Tucker was honored to meet William Nordberg in 1975, since Nordberg was a visionary and a pioneer in the study of the Earth with satellite data. In 1997 he received the William T. Pecora Award presented annually to recognize outstanding contributions by individuals or groups toward understanding of the Earth by means of remote sensing. In 2000, he received the International Society for Optical Engineering Outstanding Achievement award for his pioneering work in earth resource management using multispectral remote sensing instrumentation and data.

"It has also been an honor to have been associated with many dedicated engineers, scientists, and other people at NASA/Goddard and the University of Maryland over the years." Tucker added. "I never could have achieved what I have if it wasn't for the dedicated and extraordinary work of many colleagues."

Tucker lives in University Park, Md. and has a 25-year-old son name Corey who is currently pursuing his undergraduate degree in physics at the University of Colorado. He took off from the University of Colorado for three years to deliver pizzas. This experience "encouraged" Corey to reconsider college. ■
